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Oceanographic DataLink (ODL)

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LONG-TERM GOAL

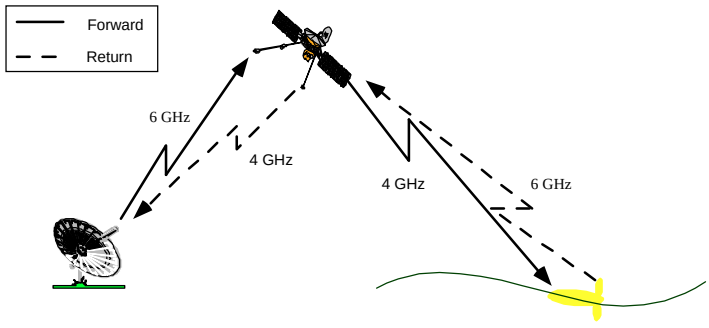
My long-term goal is to develop and demonstrate a global two-way datalink for collection of environmental data from platforms at sea. The proposed datalink would provide a two-way datalink with 10 to 100 times the capacity of ARGOS at a fraction of the yearly cost. This datalink uses existing commercial, geosynchronous satellites.

OBJECTIVES

During this two-phase Small business Technology Transfer (STTR) effort, we will work with Woods Hole Oceanographic Institute to test and demonstrate the proposed datalink over-the-air in the lab, on a buoy, and finally on a Massachusetts Institute of Technology (MIT) Autonomous Underwater Vehicle (AUV) *Odyssey*. This demonstration will be primarily functional rather than a form/fit demonstration.

APPROACH

The proposed approach is to use the Remote Environmental DataLink (REDL) design as the basis of a datalink design that can be demonstrated on a buoy and an AUV. We will complete the prototype design and conduct hardware and software integration and test prior to over-the-air demonstration. The demonstration goal is a functional, not form/fit demonstration and it addresses link closure rather than multi-access capabilities. Therefore, the demonstration architecture consists of two terminals one at the buoy and one at the demonstration hub communicating with one another. The demonstration hub includes a 4.5m antenna versus the 13m antenna to be used for the production datalink. INTELSAT satellites would be used free of charge for over-the-air testing.



WORK COMPLETED

This is the second phase of a two-phase SBIR effort. During Phase I, the REDL system design was reviewed and updated. We evaluated a number of prototype configurations, measured loss associated with placing the entire electronics including antenna within the fairing, and evaluated the performance

of the AUV on the surface. We also defined the prototype radio frequency (RF) architecture. During Phase II, we have complete remaining software design and test and have begun hardware and software integration. Roughly two-thirds of the REDL modem board has been tested.

RESULTS

Phase I analysis determined that the proposed design can be housed in the planned AUV with very little attenuation of the transmitted or received signal. Phase I analysis also indicates that positioning of the AUV on the surface is possible for antenna positioning. Finally, simulation results confirm predicted link parameters including expected loss due to fading.

The second phase was recently awarded and significant progress has been made. To date, there have not been any specific results of the Phase II work, yet we are encouraged by our progress and expect a demonstration late in 1999, a little ahead of schedule.

IMPACT/APPLICATION

Successful demonstration of this effort would provide oceanographers the biggest advanced in telemetry in decades. This is necessary with all the recent advances in sensors and systems since even more capacity is needed to effectively use these new tools. Communication has long been a bottleneck for oceanographers; hopefully ODL will relieve this somewhat.

In addition, this datalink is the foundation for a low cost datalink for many other remote data applications including asset tagging and tracking, stolen vehicle recovery, and fixed site monitoring. This effort, in concert with the Air Force's Global Location and Tracking System (GLTS), will demonstrate the use of the proposed datalink for both land and marine applications.

TRANSITIONS

This effort is one of two efforts currently under way by our team to demonstrate this datalink for remote data collection. We are leveraging a past design and common requirements to effectively utilize limited government resources to achieve demonstrations not possible within the cost constraints of a single STTR phase II effort.

RELATED PROJECTS

The Global Location and Tracking System is an Air Force SBIR Phase I and II effort to demonstrate the use of this datalink for global asset tagging and tracking. Phase I is complete; Phase II is underway. Joe Mancini at Rome Labs is the Air Force technical point of contact.

REFERENCES

"Oceanographic DataLink Phase I Final Report," December1997.

PUBLICATIONS

Gamache, K.A., 1998: "Oceanographic Telemetry – The Future", Oceans Community Conference, Baltimore, MD, Nov.